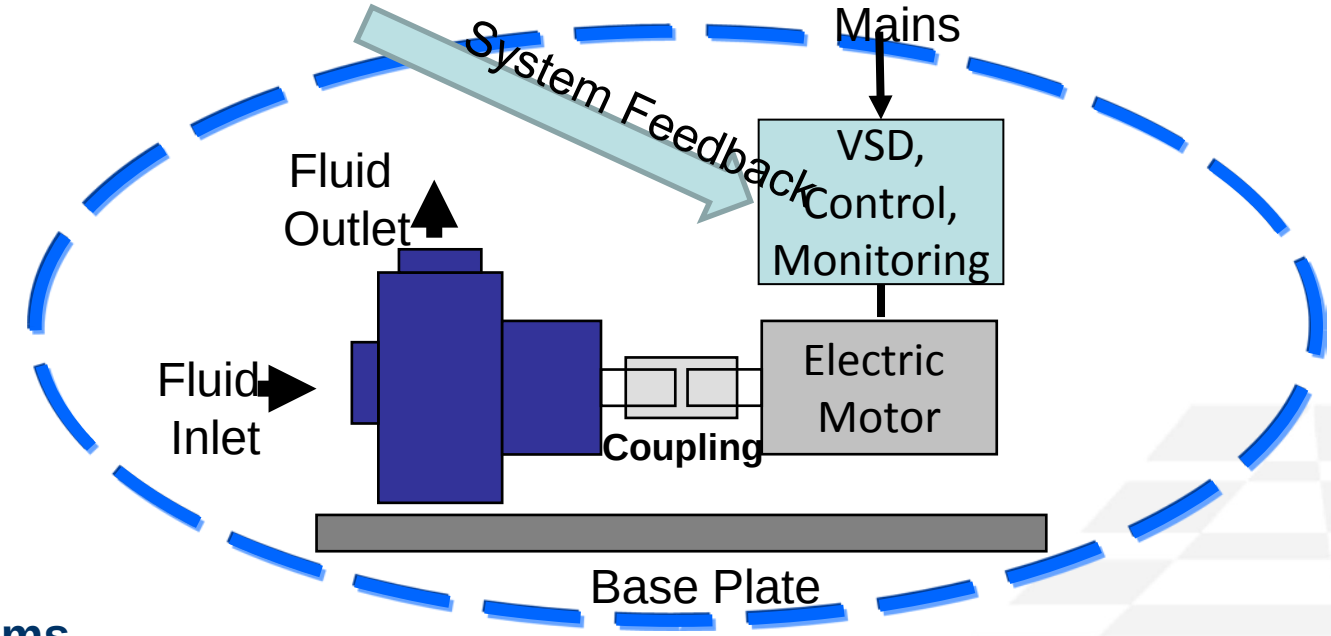
Definitions

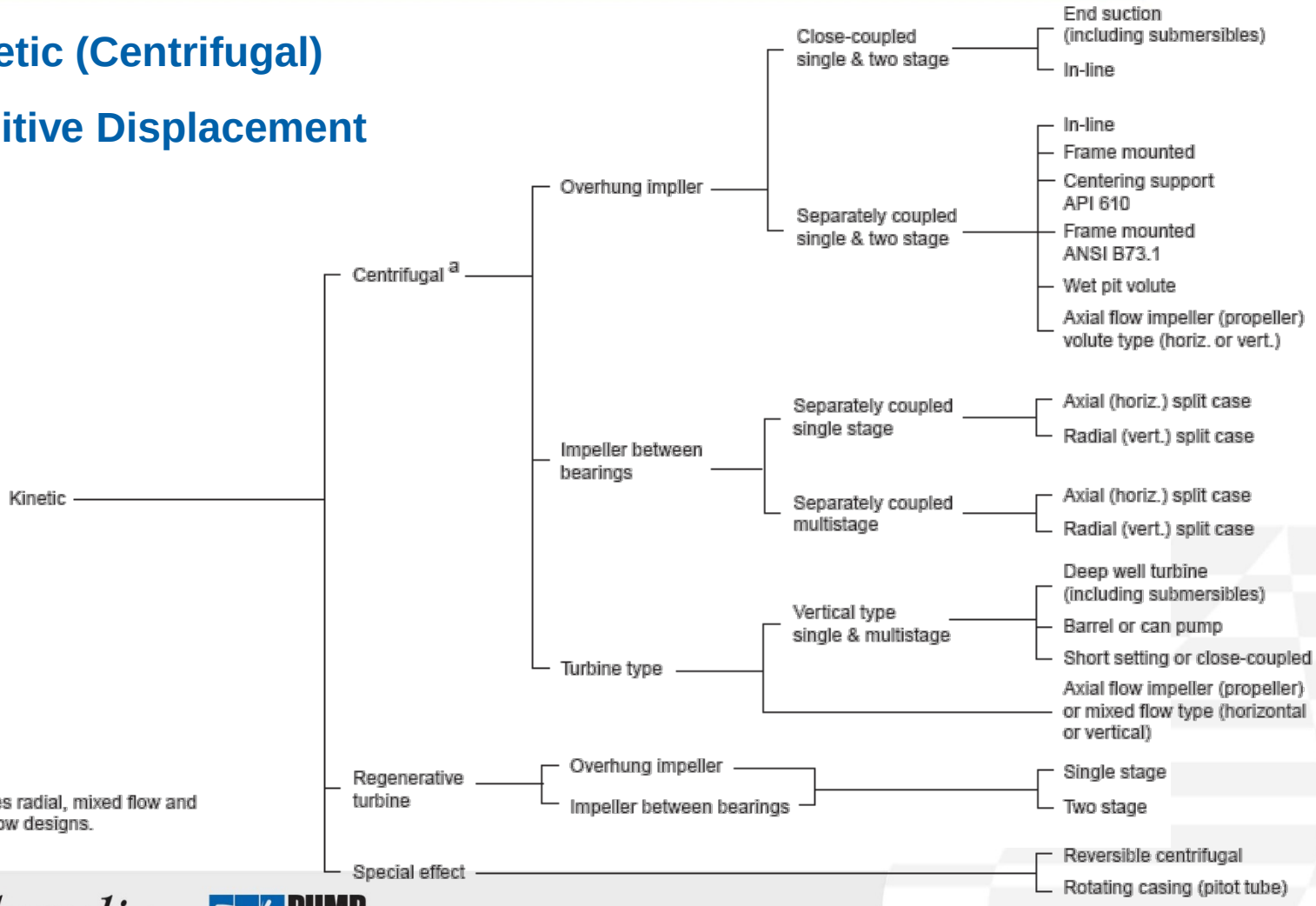
- **Pump – Pump End Only**
- **Extended Product – Pump; Driver; VFD; Controls (Feedback)**



- **Pump Systems**

Product Types -

1. Kinetic (Centrifugal)
2. Positive Displacement



[a] Includes radial, mixed flow and axial flow designs.

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Scope Applied in Developing Estimate -

Only clean water pumps, including WW (grey water, but excluding solids) meeting the following:

25 GPM and greater, Maximum 295', 1-200HP

Temp range from -10 deg C to +120 deg C

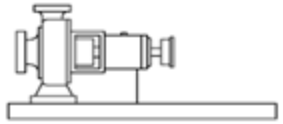
Pumps specifically excluded include:

Positive displacement & Fire Pumps

Self priming & WW pumps (pumping solids)

	Applications			
Duties	Commercial Buildings	Drinking Water Pumping	Agriculture	Food Industry
Heating & AC	x	x	x	x
Clean water processing				x
Wells		x	x	x
Water treatment	x	x		x
Pressure boosting	x	x	x	x

Product Types Within Scope -

PUMP TYPES			
	EU Nomenc.	ANSI/HI Nomenc.	Description
	ESOB	OHO	Flexibly Coupled Horizontal, Frame Mounted Centrifugal
		OH1	Flexibly Coupled Horizontal, Foot Mounted Centrifugal
	ESCC	OH7	Close Coupled Single Stage, End Suction
	ESCCI	OH3	Flexibly Coupled Vertical, In-Line Centrifugal
		OH4	Rigidly Coupled Vertical, In-Line Centrifugal
	No eqv.	OH5	Close Coupled Vertical, In-Line Centrifugal
	MS	VS8	In-line casing diffuser
	MSS	OH8A	Close Coupled, Submersible Diffuser Centrifugal

MEI Pump Evaluation Tool

INPUTS									Computed Values						MEI = 0.10				MEI = 0.40			
				75% BEP C	110% BEP Q	MARKETS SERVED			MEI=0.10	MEI=0.40					EN Min Eff 2012				EN Min Eff 2015			
Pump Type	Q (GPM)	H (ft)	Eff-BEP	Eff-PL	Eff-OL	Water	Irrigation	HVAC	C-pump	C-pump	Q(m^3/hr)	H (m)	N	ns(metric)	Eff-bep	Eff-PL	Eff-OL	Pass/Fai	Eff-bep	Eff-PL	Eff-OL	Pass/Fail
ESOB-2 pole	245	312	66	62	65	Yes		Yes	135.6	130.27	46.1	65.3	2900	14.3	54.0	51.1	53.2	PASS	59.3	56.2	58.4	PASS
ESOB-2 pole	380	300	71	67	70.4	Yes		Yes	135.6	130.27	71.5	62.8	2900	18.3	62.2	58.9	61.3	PASS	67.5	63.9	66.5	PASS
ESOB-2 pole	410	299	68	64.5	67.25	Yes		Yes	135.6	130.27	77.1	62.6	2900	19.1	63.4	60.0	62.4	PASS	68.7	65.1	67.7	FAIL
ESCC-2 pole	775	288	69	67	68	Yes		Yes	135.93	130.77	145.8	60.3	2900	27.0	71.1	67.3	70.0	FAIL	76.2	72.2	75.1	FAIL
ESCC- 4 pole	760	71	84	79.8	83.5	Yes		Yes	132.74	128.46	142.9	14.9	1450	38.2	76.6	72.6	75.5	PASS	80.9	76.6	79.7	PASS
ESOB-4 pole	840	65	83	78	81.5	Yes		Yes	132.58	128.07	158.0	13.6	1450	42.9	77.3	73.2	76.2	PASS	81.9	77.5	80.6	PASS
ESOB-4 pole	900	67	83	78	82.2	Yes		Yes	132.58	128.07	169.3	14.0	1450	43.4	77.6	73.5	76.4	PASS	82.1	77.7	80.9	PASS
ESOB-4 pole	1800	72.5	88	82	86.8	Yes		Yes	132.58	128.07	338.6	15.2	1450	57.8	78.5	74.3	77.3	PASS	83.0	78.6	81.7	PASS
ESOB-4 pole	342	102	70	66	69	Yes		Yes	132.58	128.07	64.3	21.4	1450	19.5	65.9	62.4	64.9	PASS	70.4	66.7	69.3	FAIL
ESOB-4 pole	142	118	53	49.5	52	Yes		Yes	132.58	128.07	26.7	24.7	1450	11.3	46.7	44.2	46.0	PASS	51.2	48.5	50.4	PASS
ESOB-4 pole	324	113	71	68	70	Yes		Yes	132.58	128.07	60.9	23.7	1450	17.6	63.5	60.2	62.6	PASS	68.0	64.4	67.0	PASS
ESOB-4 pole	470	109	78	74	77	Yes		Yes	132.58	128.07	88.4	22.8	1450	21.8	69.4	65.7	68.3	PASS	73.9	70.0	72.8	PASS
ESOB-4 pole	970	120	86	82.25	84.75	Yes		Yes	132.58	128.07	182.4	25.1	1450	29.1	76.0	71.9	74.8	PASS	80.5	76.2	79.3	PASS
ESOB-4 pole	980	104	81	77	80	Yes		Yes	132.58	128.07	184.3	21.8	1450	32.5	76.9	72.8	75.7	PASS	81.4	77.1	80.2	FAIL
ESOB-4 pole	1665	97.5	85.5	81.5	84.5	Yes		Yes	132.58	128.07	313.2	20.4	1450	44.5	79.3	75.1	78.1	PASS	83.8	79.3	82.5	PASS
ESOB-2 pole	342.5	28.86	58.72	51	53	Yes		Yes	135.6	130.27	64.4	6.0	2900	100.6	62.8	59.5	61.9	FAIL	68.1	64.5	67.1	FAIL
ESOB-2 pole	200	84.5	67.64	64.2	67.25	Yes		Yes	135.6	130.27	37.6	17.7	2900	34.4	66.9	63.3	65.9	PASS	72.2	68.4	71.1	FAIL
ESOB-2 pole	619	327.5	77.57	74	76.5	Yes		Yes	135.6	130.27	116.4	68.6	2900	21.9	67.7	64.1	66.7	PASS	73.0	69.1	71.9	PASS
ESOB-4 pole	700	112.5	83	80	81.5	Yes		Yes	132.58	128.07	131.7	23.6	1450	25.9	73.6	69.7	72.5	PASS	78.1	73.9	76.9	PASS
ESOB-4 pole	384	172.2	63	60	62	Yes		Yes	132.58	128.07	72.2	36.1	1450	14.0	58.9	55.8	58.0	PASS	63.4	60.1	62.5	FAIL
									#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

	MEI-0.10	MEI-0.40	n (60 hz)	n(50 Hz)
ESOB-4 pole	132.58	128.07	1750	1450
ESOB-2 pole	135.6	130.27	3500	2900
ESCC- 4 pole	132.74	128.46	1750	1450
ESCC-2 pole	135.93	130.77	3500	2900
ESCCI- 4 pole	136.67	132.3	1750	1450
ESCCI- 2 pole	139.45	133.69	3500	2900
MS -V- 4 pole	143.45	130.38	1750	1450

	Market			
	Water	Irrigation	HVAC	Total
Number of Pumps Passed MEI = 0.10	18	0	18	18
Number of Pumps Passed MEI = 0.40	13	0	13	13
Number of Pump Analyzed	20	0	20	20
Percent of Pumps Passed (MEI=0.10)	90%	#DIV/0!	90%	90%
Percent of Pumps Passed (MEI=0.40)	65%	#DIV/0!	65%	65%

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Application Results

Pump type	Stock consumption [TWh]	Reduced energy consumption in [TWh] by cut-off [%]								
		5%	10%	15%	20%	30%	40%	50%	60%	80% (2)
ESOB 1450	27.00	26.79	26.66	26.55	26.44	26.23	26.03	25.80	25.49	25.35
ESOB 2900	27.00	26.82	26.66	26.52	26.40	26.18	25.99	25.76	25.46	25.33
ESCC 1450	20.25	20.09	19.99	19.90	19.82	19.68	19.53	19.38	19.21	19.13
ESCC 2900	20.25	20.12	20.00	19.90	19.82	19.66	19.51	19.36	19.21	19.13
ESCCI 1450	12.00	11.91	11.85	11.80	11.75	11.65	11.55	11.45	11.32	11.27
ESCCI 2900	12.00	11.90	11.82	11.76	11.69	11.56	11.46	11.34	11.21	11.14
MS 1450	4.50	4.48	4.46	4.44	4.41	4.36	4.30	4.26	4.20	4.17
MS 2900	4.50	4.46	4.44	4.42	4.40	4.36	4.32	4.28	4.19	4.15
MSS 2900	16.80	16.65	16.53	16.42	16.32	16.15	15.93	15.79	15.53	15.43
Total stock consumption [TWh]	144.30	143.22	142.40	141.71	141.05	139.85	138.63	137.41	135.82	135.12
energy savings in 10 years from now [%]		0.75%	1.31%	1.79%	2.25%	3.08%	3.93%	4.77%	5.87%	6.36%
energy savings P1 in 10 years from now [TWh]		**1.08**	**1.90**	**2.59**	**3.25**	**4.45**	**5.67**	**6.89**	**8.48**	**9.18**

EU Pump Mfg Cost to Comply (EU Document)

- **10% - $ 58M in investment**
- **20% - $ 163M**
- **40%- $ 440M**
- **50%- $ 744M**
- **80% - $1900M ($1.9B)**

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Recommendation (Summary):

- **Same scope as EU Water Pump Standard (TC197)**
  - Clean Water 25 GPM and greater, Maximum 295'TDH
  - 1-200HP; Temp range from -10 deg C to +120 deg C
- **US Pump Nomenclature – ANSI/HI 1.3-2009**
- **European Approach – MEI (Lot11) 10% 2013 – *1.9TWhr/year***
- **Scope of products (Extended Products):**
  - All applications with variable load and low static head.
  - Average load calculations, savings of *9.8TWhr/yr*

- ***Energy Savings 1.9+9.8= 11.6TWhr/yr – 2020 Latest***